"NRCS Technology News" December 2005

United States Department of Agriculture
Natural Resources Conservation Service
Science and Technology

"NRCS *Technology News,*" provided by Science and Technology, delivers pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas.

"NRCS *Technology News*" is in a format that is available to all NRCS field staff. The formatted color version is available at http://www.nrcs.usda.gov/technical/SandT/Tech-News/TechNews-Dec05.pdf.

Features in this issue include:

MESSAGE FROM THE DEPUTY CHIEFS

CEAP Watershed Assessment Studies: Critical Partnerships for Technology

CONSERVATIONIST'S CORNER

Producers Using Idaho's Conservation Planning Software
Richard Sims, Idaho State Conservationist

NEW PRODUCTS AND SERVICES

NPDC Partners with SEEK to Improve Ecological and Biological Data Accessibility

Establishment of the National Geospatial Development Center

TECHNOLOGICAL ADVANCES

The Benefits Transfer Method: Reusing Economic Studies
Mineralogy Analysis Capabilities of the Soil Survey Laboratory

TECHNOLOGY TRANSFER

IKONOS Imagery Used for USDA's NRI in Alaska
Wind Erosion Prediction System (WEPS)

WEB-BASED TECHNOLOGY

PLANTS Images featured on Two Notable Web sites

MESSAGE FROM THE DEPUTY CHIEFS

CEAP Watershed Assessment Studies: Critical Partnerships for Technology

What are the effects of the conservation practices we help our clients implement? This is the fundamental question addressed by the Conservation Effects Assessment Project (CEAP). The goal of CEAP is to develop a scientific means of quantifying these effects to supply accurate information to decision makers. The implications of this undertaking are huge for our technology delivery system and for national policy and program development. For NRCS and its clients, CEAP can lead to a better understanding of where and when practices should be applied in order to maximize effectiveness and to best achieve environmental goals. For USDA leadership, the Congress, and others, CEAP can provide information vital to the development of effective conservation programs and the use of the public conservation dollar.

Although Congress charged NRCS with the leadership of CEAP, this assessment is a collaborative partnership effort. We have technical support from the Agricultural Research Service (ARS), the Cooperative State Research, Education and Extension Service (CSREES), the National Agricultural Statistics Service (NASS), the Farm Service Agency, and other partners outside of USDA to ensure that CEAP provides scientifically credible information. The National Assessment component of CEAP, which utilizes the National Resources Inventory (NRI) sampling framework, farmer survey data from NASS, and field-level physical process models to estimate the physical effects of various practices, is complemented by the Watershed Studies component – currently 28 individual watershed case studies representing a wide array of resource issues and modeling techniques.

There are three CEAP watershed categories:

- ARS Benchmark Watersheds will provide information needed to verify accuracy of models used in the National Assessment. These watersheds were selected with a focus on water and soil quality and water conservation as primary resource concerns on rain-fed agricultural land.
- NRCS Special Emphasis Watersheds address specific resource concerns, such as manure management from animal feeding operations and water use and conservation on irrigated cropland.
- CSREES Competitive Grant Watersheds will focus on understanding how best to schedule and locate conservation efforts within a watershed in order to achieve locally defined water quality goals. Each CSREES watershed study includes a socio-economic component.

The NRCS Special Emphasis Watersheds were selected from nominations made by the NRCS State offices. Projects were selected based upon their history of practice application, the availability of water quality monitoring data, and the capability of assessment/modeling being performed. Other considerations included the extent of collaboration with other organizations and the diversity of geography and land uses/resources compared to other selected ARS watershed projects.

Here are two examples of the work that NRCS coordinates in the eight Special Emphasis Watersheds:

- The Choptank River watershed study area in Maryland is a 400,000 acre watershed within the Chesapeake Bay drainage area that has water quality impaired by sediment and nutrients. NRCS has contracted with ARS to lead the collaborative effort with the National Oceanic and Atmospheric Administration, the University of Maryland, and others. The study involves collecting water quality data in 15 sub-basins for input into the Soil & Water Assessment Tool (SWAT) and Riparian Ecosystem Management Model (REMM). According to Ginger Murphy, the Maryland State Conservationist, "There is a lot of focus right now on the effects of BMPs [best management practices] on water quality in the Chesapeake Bay, so the timing of our CEAP effort is excellent." The Choptank study will evaluate the impact of buffers between the edge of fields and the water body that were installed through the Conservation Reserve Program and the Conservation Reserve Enhancement Program. ARS also intends to compare current water quality data with other data collected prior to the implementation of conservation practices. This analysis will allow an evaluation of the impact of practices and the time lag between practice application and improvement in water quality.
- The Upper Snake Rock Creek watershed study area in southern Idaho employs a similar collaborative effort with ARS. The goal of this study is to understand water quality and quantity issues relating to dry land irrigation. It will validate models to assess the effectiveness of different types of irrigation practices in managing water quantity and the beneficial placement of conservation practices to improve surface and ground water quality. According to State CEAP Coordinator John Kendrick, "This project will give us useful information that we can share with our partners and producers in managing irrigation water."

Whether you are a program manager, a specialist developing Conservation System Guides, or a field conservationist offering alternatives to producers, the CEAP Watershed Assessment Studies are valuable opportunities to better understand the landscapes we serve and the effectiveness of our technology.

CONSERVATIONIST'S CORNER

Producers Using Idaho's Conservation Planning Software

Over 150 of Idaho's farmers and ranchers have used the new OnePlan software to start a conservation plan.

In addition, several Idaho NRCS field offices are now using the software for all their new conservation plans. Keith Griswold, district conservationist in the Cascade field office, worked with eligible Conservation Security Program producers to login to OnePlan and document their current conservation work and future enhancements.

The OnePlan software, created by Idaho NRCS and a host of conservation partners, offers producers a one-stop shop for all their conservation planning needs. The free, web-based software provides producers a secure login to:

- Access GIS maps of their farm/ranch as well as soils and climatic data.
- Download farm-level imagery and access information on conservation practices applicable to their particular resource setting.
- Plan conservation practices on a field-by-field basis.
- Determine and schedule animal waste and fertilizer rates.
- Use the time-tested NRCS nine-step conservation planning process, develop a preliminary plan online and email it to the local Soil Conservation District.
- Access links for financial assistance.
- Use the Conservation Planner and Nutrient Management Planner modules. The Pest Management Planner and Range Planner are in development.

Idaho NRCS has shared the OnePlan programming scripts with Vermont, Oregon, Iowa and several other states to help them create their own version of the software.

NRCS developed the software in partnership with the Idaho Soil Conservation Commission, Idaho Association of Soil Conservation Districts, University of Idaho, Environmental Protection Agency, Idaho Department of Environmental Quality, Idaho Dairymen's Association and the Cooperative Extension Service.

The OnePlan website is at www.oneplan.org .

Contact: Wayne Newbill, OnePlan Coordinator, (208) 338-4321 or wnewbill@idahoag.us.

NEW PRODUCTS AND SERVICES

NPDC Partners with SEEK to Improve Ecological and Biological Data Accessibility

The NRCS National Plant Data Center (NPDC) is collaborating with the Science Environment for Ecological Knowledge (SEEK) project. SEEK is a university consortium designing informatics infrastructure for ecological data in order to advance

ecological and biodiversity science. Their integration technology will allow users to combine large amounts of information from disparate sources.

The NPDC's PLANTS Database (http://plants.usda.gov), being one of the major plant data resources in the United States, will be one of the primary resources integrated. This partnership will increase PLANTS data accessibility and also enrich PLANTS with new records and data. The National Plant Data Center is pleased to be a part of this cutting-edge effort in eco-informatics.

For more information on the SEEK project, visit their Web site at http://seek.ecoinformatics.org/ .

For more information, contact:
National Plant Data Center
225-775-6280

Establishment of the National Geospatial Development Center

The National Geospatial Development Center (NGDC), a collaborative between the U.S. Department of Agriculture-Natural Resources Conservation Service (NRCS) and West Virginia University (WVU), was established in 2004 to support the natural resource business needs of NRCS through the innovative use of geographic information science technology (Geographic Information Systems (GIS) and related tools).

In cooperation with other NRCS Centers, government agencies, academic institutions, and the private sector, NGDC is responsible for the research and development of geospatial tools to support and expand the efficient delivery of NRCS programs. The NGDC also provides opportunities for graduate and undergraduate students interested in the application of geospatial technologies to natural resource issues.

The NGDC is led by NRCS Co-Director Jon Hempel and WVU Co-Director Trevor Harris. NGDC staff consists of NRCS and WVU staff, WVU affiliated faculty, plus graduate and undergraduate research assistants. The staff has expertise in soil science, GIS, cartography, database management, scientific geovisualization, remote sensing, and computer programming.

Organizationally, NGDC reports to the Soil Survey Division within the Soil Survey and Resource Assessment Deputy Area of NRCS; however, the NGDC will address projects from across the agency.

NGDC Office and Staff

The NGDC office is located on West Virginia University's downtown Morgantown, WV campus. The office is currently housed on the ground floor of the Chemistry Research Annex, former home of the Physical Sciences Library.

Computing resources are up-to-date and consist of a 10 terabyte array for data storage and three quad-processor servers for daily operations and application development. The NGDC is connected to the WVU network through a gigabit connection. USDA resources are accessed through VPNs.

NRCS staff consists of Co-Director Jon Hempel, Spatial Data Specialist Sharon Waltman, Data Management Specialist Henry Ferguson, GIS Specialist Amanda Moore, Natural Resources Specialist David Arthur, and Administrative Assistant Jill Arnott. A Business Analyst position will be filled in the near future.

WVU staff includes Co-Director Dr. Trevor Harris (Department Chair, WVU Department of Geology and Geography), Geospatial Technology Coordinator Jesse Rouse, Visualization Coordinator Vic Baker, System Administrator Jim Canon, and Administrator Dr. Briane Turley. Affiliated faculty from the Department of Geology and Geography include Dr. Tim Warner and Dr. Jennifer Miller.

For a complete listing of NGDC staff and students, as well as detailed directions to our office, please visit our website http://www.ngdc.wvu.edu.

National Geospatial Development Center
PO Box 6301
157 Clark Hall Annex, Prospect Avenue
West Virginia University
Morgantown, WV 26506

TECHNOLOGICAL ADVANCES

The Benefits Transfer Method: Reusing Economic Studies

Monetary valuations of non-market goods and services, such as water quality and wildlife, are estimated in terms of willingness to pay (WTP), defined as the maximum amount of money a person is willing to pay in order to obtain some level of the good or service. This includes both the amount actually paid and the consumer surplus. Consumer surplus measures the difference between what is person is willing to pay for a commodity and the amount he/she actually is required to pay. A common NRCS example is to estimate the value of recreational opportunities created or improved by NRCS projects.

For recreational activities, NRCS has historically used three methods to determine the willingness to pay: the travel cost method (TCM), contingent valuation method (CVM), and unit day value (UDV) method.

- The basic premise of the Travel Cost Method (TCM) is that per capita use of a recreation site will decrease when costs (out-of-pocket and time) of traveling to the site increase, other variables being constant. TCM consists of deriving a demand curve by using the variable costs of travel and the value of time as proxies for price. This method requires surveys of users to obtain the needed data.
- The Contingent Valuation (CV) Method estimates benefits by directly asking individual households their willingness to pay for changes in recreation opportunities at a given site. Individual values may be aggregated by summing willingness to pay for all users in the study area. The surveying technique is complicated to develop and expensive to complete. But contingent valuation

technology has been continually improved and used thousands of times since its acid-test in developing the environmental damage estimates after the Exxon Valdez Oil Spill in 1989.

- The Unit Day Value (UDV) method provided in Principles and Guidelines for Water Resource Projects uses a standard table to calculate a quality-based value per user day. This table was originally created in 1962 and has been indexed by the Consumer Price Index (CPI) since then. CPI has increased these values by 650%. However US per-capita income has increase by 1400%, making the Unit Day Values increasingly conservative over time.

A new method enables NRCS to investigate the possibility of using more recent non-NRCS recreation studies for its own project areas. This is an exciting prospect because the Travel Cost and Contingent Valuation methods are prohibitively expensive for the foreseeable NRCS budgets. The new method is "Benefit Transfer" which allows NRCS to evaluate the possibility of quickly reusing, or transferring, existing Travel Cost and Contingent Valuations Study estimates from one geographic location to another.

A most useful introduction to Benefit Transfer is "Benefit Transfer of Outdoor Recreation Use Values: A Technical Document Supporting the Forest Service Strategic Plan", Randall S. Rosenberger and John B. Loomis, available at www.fs.fed.us/rm/pubs/rmrs_gtr72.pdf. This document is backed by a database of 700 recreation valuation studies.

To discuss Benefits Transfer and other economic technologies, please contact your state economist, or your National Technology Support Center Economists, David.Buland@ftw.usda.gov, Central; Kevin.Boyle@por.usda.gov, West; or Madalene.Ransom@gnb.usda.gov, East.

http://www.economics.nrcs.usda.gov/technical/recreate/

Mineralogy Analysis Capabilities of the Soil Survey Laboratory

The Soil Survey Laboratory (SSL) at the National Soil Survey Center (NSSC) performs many soil property analyses, which can be grouped as chemical analyses (pH, CEC, trace element composition, etc.), physical analyses, (particle size distribution, bulk density, water content, etc.), and mineralogical analyses (clay species (kind of clay) and amounts, and kinds of minerals in the silt and fine sand fractions). Most of the laboratories associated with the National Cooperative Soil Survey are equipped to perform the chemical analyses and particle size distribution analysis. Few are equipped for mineralogical analysis or for bulk density and water release analysis by the clod method used at the SSL.

The primary mineralogical analysis for coarser-textured soils is optical grain counts. For this analysis, the most abundant particle size fraction in the coarse silt to fine sand range is separated and placed on a microscope slide. A petrographic microscope is used to view, identify and count a minimum of 300 individual mineral grains. The number of grains of each mineral species is reported. The data are grouped as "resistant" and "weatherable" minerals to determine the relative weathering potential of the soil material.

The relative weathering potential is considered for taxonomic classification and for interpretations of the potential of the soil to supply plant growth nutrients. The mineralogical classification is a component of the soil taxonomic classification. The data are used for other interpretations (high amounts of mica contribute to slip failure, for example) and are used to provide information about the soil parent material.

The important questions about clay in soils are, "What kinds of clay are present, and in what quantities?" The primary method used for clay mineral analysis is X-ray diffraction (XRD). The clay-size fraction is separated from a soil sample and placed on slides by a method that orients the clay particles with reference to one crystal axis. Each kind of clay has a specific crystal structure. The slides are treated several times with different saturating cations and with different heat treatments. The cation and heat treatments cause changes in the clay structure, and the kinds of changes differ from clay to clay. Potassium, for example, will expand the distance between layers of certain clays, but will have no effect on other clays.

The clay samples are then analyzed in an X-ray diffractometer. An X-ray beam is directed into the sample at a specific angle. The angle at which the beam is diffracted (changed in direction) by the clay depends upon the clay mineral and the treatments the clay sample has received. The angle of refraction is measured for each of the treatments, and the sizes and presence or absence of intensity peaks in the refracted X-ray beam allows identification of the kind of clay in the sample. Only a rough estimate of the quantity of the clay can be made from the X-ray procedure. If more accurate measurement of the amount of clay is desired, the sample is analyzed by one of two heat-treating methods (differential scanning calorimetry (DSC) or thermogravimetric analysis (TGA)). These methods measure energy change (DSC) or weight change (TGA) as the clay minerals are decomposed by heat. Although these techniques allow much more accurate measurement of clay volume, not all clays respond to heat treatments. However, the heat (thermal) treatment values allow one of the clay minerals determined by XRD to be used as an internal standard, so the estimate of the quantity of the other clays in the sample can be made more accurately.

The clay fraction is the most chemically and physically active fraction of most soils, so even a small amount of clay can substantially influence the properties (and, thus, the interpretations for use) of the soil. The amounts and kinds of clay minerals in soils are important for soil classification and many interpretations for soil use and management. Clay properties strongly influence both fertility and physical properties of most soils.

The mineralogical analyses are very time-consuming, so SSL performs those analyses on a subset of the samples analyzed by the laboratory. Statistical methods are used to derive relationships to estimate mineralogical properties for samples that are not analyzed.

The image analyzer is another instrument used to provide mineralogical information. A thin section or grain mount is placed in a petrographic microscope to which a digital camera has been attached. A computer captures a calibrated image of the sample, and software on the computer can be used to determine grain sizes, pore sizes, clay film thickness, grain shape parameters (such as roundness), the areas of different colors, and many other visual features of the sample. These analyses are quite time-consuming, so

they are typically performed only on special projects, or when an unusual question arises when analyzing data.

For more information, contact:
Ellis Benham
Research Soil Scientist
Soil Survey Investigations
National Soil Survey Center
(402) 437-5132
ellis.benham@lin.usda.gov

TECHNOLOGY TRANSFER

Space Imaging's IKONOS Imagery Used for USDA's Natural Resources Inventory in Alaska

Alaska Natural Resource Conservation Service (NRCS) has awarded a contract to Space Imaging to provide high-resolution IKONOS satellite imagery of Alaska for the Natural Resources Inventory (NRI) program. This program serves as the federal government's principal source of information on the status, condition and trends of soil, water and related resources in the United States. For the first time ever, the USDA will use a combination of archive and newly tasked IKONOS satellite images to map and apply NRI primary data elements to inventory land use, evaluate loss of farmland to urbanization, measure the effectiveness of conservation practices and detect changes to the landscape from soil erosion.

"In the past, we have mainly relied on aerial photos and people in the field for our inventory. However, the high-resolution quality of the IKONOS images provides us with a more accurate mapping product which saves us time and resources," said Ted Cox, state GIS coordinator of the U.S. Department of Agriculture. "The information we collect with the IKONOS imagery will give us a future reference on which we can compare and register changes. Once we have this in place, most of data elements can be collected with remote sensing so that field visits can be limited."

The inventory process has a longer cycle in Alaska due to the difficult logistics of acquiring data in its remote regions. IKONOS has been initially tasked to capture images of 38 contiguous areas of interest. An additional 350 areas of interest will eventually be acquired. Some areas captured by IKONOS allow the NRI to cluster samples and view two to three primary sample units at one time, which enables it to maximize its return on investment.

"Alaska's unique landscape and remoteness make it an ideal area where satellite imagery can significantly assist in assessments," said Jim Roper, director of sales at Space

Imaging. "Using IKONOS images improves the USDA's ability to inventory, monitor and assess the status and trends of our nation's natural and environmental resources."

The NRI is a statistical survey of land use and natural resource conditions and trends on U.S. non-federal lands. As part of its urban assessment program, the NRI can determine how much land has been gained or lost over a period of time. The NRI program is responsible for inventory of privately-held urban land including crop land and range land, and to conserve and sustain natural resources in the 50 states and U.S.-owned territories.

About Space Imaging

Space Imaging is the premier provider of satellite imagery enabling businesses, governments and individuals to better map, measure, monitor and manage the world in which we live. Based near Denver, Colo., Space Imaging radically transformed the Earth information market when in 1999 it launched IKONOS, the world's first commercial high-resolution imaging satellite. Today, Space Imaging's products are the cornerstone of the remote-sensing industry. The company supplies the highest quality, most accurate, visual information about the planet's changing natural and cultural features. Space Imaging's customer-centric business lines include imagery from satellites, geospatial solutions for the defense and intelligence community, and direct access to its satellites for corporations and governments. It is a privately held company with partners, resellers and 14 affiliate ground stations around the world. Space Imaging is a member of the U.S. Geospatial Intelligence Foundation. For more information on products and services, please visit www.spaceimaging.com.

Wind Erosion Prediction System (WEPS)

Wind erosion damages the soil, endangers life, reduces crop production, increases sedimentation, and causes air quality problems in many parts of the world. The need for an improved model to estimate wind erosion and compare conservation systems is unquestionable. However, estimating wind erosion is a formidable problem that has been extensively researched in the U.S. for over 50 years.

WEPS combines the latest wind erosion science with data bases and computers to provide a significant advancement in wind erosion prediction technology. This new model is expected to replace the current empirically-based wind erosion equation (WEQ), with a fully automated, process-based simulation model. WEPS operates by processing data bases that simulate wind, soil, climate, and field conditions on a site-specific basis. Based on field tests, the model is being evaluated and modified to assure this new tool will fit requirements at NRCS field office level. Although the processes modeled are very complicated and data intensive, the user only has to input a few commands directing the computer to the appropriate data bases to estimate erosion and produce an array of site specific reports.

The natural forces and processes involved in both wind and water erosion are very similar, and the required WEPS data bases are very similar to those contained in the new RUSLE model currently used to estimate water erosion. So, some of the ongoing field

work involves developing common data bases to be used by both models. If successful, that effort will reduce data base development and maintenance requirements for the present and future. WEPS should be available for field use during the later part of 2006.

For additional information, contact Arnold King at the Central National Technology Support Center in Fort Worth, Texas at 817-509-3213.

WEB-BASED TECHNOLOGY

PedonCE, Soils Field Data Recorder Now Available

Historically field soil descriptions were collected on paper forms (the venerable SOI-232). The descriptions were filed in folders and notebooks, and at the completion of a soil survey, many were archived or in many cases, lost and thrown away. Even if the pedon descriptions were saved, they were not readily available to most users.

PedonCE, an application designed for personal digital assistants (PDAs), is designed as a tool for soil scientists to collect soil descriptions electronically in the field. The soil descriptions in the PDA are then imported into the National Soils Information System (NASIS) where they are permanently stored for future use. No longer is this valuable information subject to potential loss, destruction, or unavailable on paper forms. Any NASIS user in the world can access this information.

PedonCE can be loaded on most PDAs that use the Pocket PC operating system. With practice using the stylus on the PDA screen, descriptions can be entered efficiently and accurately using existing NASIS codes and choices. Choices are available from drop-down menus, and choice lists can be customized to fit a particular area of interest.

For more information on PedonCE, contact:

Alan Price, Soil Scientist
National Soil Survey Center
Phone: 970-295-5450
alan.price@lin.usda.gov

PLANTS Images featured on Two Notable Web sites

Images from the PLANTS Gallery are routinely downloaded for variety of publications and Web sites. However, the National Plant Data Center is especially pleased to see its images featured on two Web sites in particular, Wisdom of the Elders (WOE) and the United Nations Environmental Programme (UNEP) – World Conservation Monitoring Centre.

Wisdom of the Elders is an American Indian non-profit organization based in Portland, Oregon. They support a new Corporation of Public Broadcasting radio program and have a mission of cultural preservation, education, and race reconciliation. WOE has recorded and preserved oral history and cultural arts of over 150 exemplary indigenous elders,

storytellers, artists, and song carriers since 1992. For more information, visit their Web site at www.wisdomoftheelders.org.

PLANTS images are also featured on the UNEP – World Conservation Monitoring Centre Web site. The NPDC set up an XML feed to this site so that the organization could query PLANTS by scientific name and display thumbnail images with direct links back to PLANTS. To see an example of how the images are used, click here.

For more information, contact,
National Plant Data Center
225-775-6280

INTERNATIONAL CONFERENCE

Soil Conservation and Protection in Europe

Michael Golden, (Director Soil Survey Division); and Craig Ditzler, (National Leader Soil Classification and Standards), participated in an international conference held in Selfoss, Iceland, September 14-18, 2005. The conference was sponsored by SCAPE (Soil Conservation and Protection for Europe), a project funded by the European Commission. SCAPE's goal is to (1) encourage the conservation of soils so that environmental functions are protected and sustainable development is fostered and (2) develop draft policy documents that can be used by policy makers to achieve conservation and sustainable soil use goals. Fifty-one individuals from twenty countries attended. Participants included scientists from several governmental agencies and universities, as well as several environmental lawyers representing a wide range of legal organizations. Papers were presented at the conference, including one by Ditzler and Golden titled "Assessment and Monitoring of United States Soil Resources" in which we described how the NRCS uses the Soil Survey, National Resources Inventory, and Conservation Programs to identify resource needs for the nation and to work with landowners to achieve conservation goals. Other outcomes from the meeting included a one-page document targeted to governmental policy makers, "Call for Action on the Conservation and Sustainable Use of Global Soil Resources"; as well as a draft legal document meant to be used by countries to aid in the development of legal protocols for the sustainable use of soil resources.

The conference was hosted by the Soil Conservation Service of Iceland. The Icelandic SCS was established in 1907 and is the oldest soil conservation organization in the world. Iceland has experienced significant soil erosion due to deforestation and overgrazing. In many ways their experience compares to the 1930's dustbowl in the USA. Significant areas have been impacted by desertification. The SCS is working very successfully to control erosion and reclaim denuded, damaged areas. In addition to providing technical assistance to land managers, the SCS has a significant land reclamation research component as well as a program to grow, harvest and distribute seeds for conservation plantings. Lymegrass, Alaskan Lupine, and birch trees are significant species used in Icelandic reclamation work. As employees who began their careers with the US-SCS,

Mike and Craig found it especially enjoyable to learn they had such a close professional family in Iceland.

For further information, contact:
Craig Ditzler
National Leader, Soil Classification & Standards
National Soil Survey Center
Phone: 402-437-4009
Email: Craig.Ditzler@lin.usda.gov

NRCS TECHNOLOGY NEWS

Bruce Knight, Chief, Natural Resources Conservation Service

Lawrence E. Clark, Deputy Chief for Science and Technology

William E. Puckett, Deputy Chief for Soil Survey and Resource Assessment

NRCS Science and Technology Consortium staff should send information for **NRCS *Technology News*** to:

Dorlene J. Butler, Editor
Central National Technology Support Center
501 W. Felix St., FWFC, Building 23
Fort Worth, TX 76115
817-509-3296
Dorlene.butler@ftw.usda.gov

"NRCS *Technology News*" is published ten times per year. Back issues of **"NRCS *Technology News*"** are available at the Science and Technology Consortium Web page at http://www.nrcs.usda.gov/technical/SandT/index.html – select NRCS Technology News from the menu at the top of the page.

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, D.C. 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.